



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/697,138 | 10/30/2003 | Edmund Burke | TI-35260 | 9761 |

23494 7590 03/30/2007
TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

| |
|----------|
| EXAMINER |
|----------|

EVERHART, CARIDAD

| | |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2891

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 03/30/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

TH

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/697,138 | BURKE ET AL. | |
| | Examiner | Art Unit | |
| | Caridad M. Everhart | 2891 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-9 and 11-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-9,11-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Arguments

Applicant's arguments filed 8-18-2006 have been respectfully found to be not persuasive because applicant has argued against Gambino individually, while the rejection was made in combination with List. In addition, List was the primary reference, and Gambino was relied upon for its teaching of the cap layer, and motivation was given for providing the cap layer in the invention taught by List. The rejection has not been overcome by the arguments against the Gambino reference individually(MPEP 2145(IV)). The arguments that Gambino does not teach a cap on a cladding and that the interconnect taught by Gambino is not a metal line of the top metal interconnect level are not persuasive in part because Gambino is relied upon only for its teaching of a cap layer on the copper, which is desirable in the List reference in order to protect the copper taught by List., and for the reason given above.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1,3-9,11-15 rejected under 35 U.S.C. 103(a) as being unpatentable over List et al in view of Gambino et al (US 6,429,474B1) .

List et al disclose forming a top metal layer level which has first and second interconnect lines 72 and 74(Fig. 2). A bottom metal layer is patterned to form bottom electrode 18(Fig. 2). The capacitor dielectric 16 may be tantalum oxide(paragraph

0028). Copper may be the interconnect material(paragraph 0028). A protective layer 12 is formed and interconnect 82 is formed and connects interconnect 72 to the capacitor stack(Fig. 2).

List is silent with respect to the cap layer for line 72.

Gambino et al discloses forming a top metal level which has first and second interconnect lines (Fig. 6B shows contacts). Forming and patterning a metal layer to form bottom electrode and interconnect(Fig. 6C), in which the interconnect forms a cap or cladding to the interconnect on which it is formed. Forming a capacitor dielectric which may be tantalum oxide(paragraph 7, lines 12-18), and a top capacitor electrode(col. 20-28). The upper capacitor electrode may have a multilayer structure(col. 10, lines 48-53), and the upper electrode may have a protective overcoat and a cap which electrically connects. The layer may comprise TaN, as TaSiN is disclosed, which does comprise TaN. TiN is also disclosed. Silicon nitride is also disclosed as well as tantalum oxide for the capacitor dielectric(col. 7, lines 10-18). Al and copper are disclosed as interconnect material(col. 10, lines 48-54).



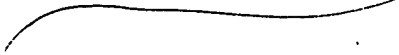
It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the protective cap taught by Gambino et al with the method and structure taught by List et al in order to protect the copper metal because List teaches in paragraph 0031 that the copper metal is sensitive and it is well known in the art that copper metal forms oxides which are detrimental to conductive contact.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

 //  // 
 //  // 

Art Unit: 2891

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

C. Everhart
3-26-2007


CARIDAD EVERHART
PRIMARY EXAMINER